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Magnetization reversal controlled by an applied voltage in $La_{0.7}Ca_{0.3}MnO_3$/(Ba, Sr)TiO_3/$La_{0.7}Ca_{0.3}MnO_3$ multiferroic tunneling junctions WEIJIN HU, MURALIKRISHNA RAJU, QI LI, Physics Department, Penn State University, University Park, PA 16802, ZHIDONG ZHANG, Institute of Metal Research, CAS, China — We report the magnetization reversal in $La_{0.7}Ca_{0.3}MnO_3$/(Ba, Sr)TiO_3/$La_{0.7}Ca_{0.3}MnO_3$ magnetic tunneling junctions by measuring the resistance switch between the two magnetic states after applying a voltage pulse. The junction size is 10 x 10 μm^2 with the barrier thickness in the range of 1-1.5 nm. The ferroelectric barrier allows us to apply a large voltage ($\sim$ 3V) with very low current. We have found that magnetic state of the junction can be switched both from the antiparallel to parallel state and from the parallel to antiparallel state in certain field ranges. The switching does not depend on the polarity of the electrical field direction. The critical voltage for the switching depends on the magnetic field with higher voltage needed for lower magnetic field. The switching current density is in the order of 10^3 - $10^4 A/cm^2$, which is much smaller than the usually observed $\sim 10^7/cm^2$ in metallic tunneling junctions by spin transfer torques. The details of the switching voltage as a function of magnetic field and the manipulation of the magnetic states using a voltage will be discussed.

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